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THE WORK OF THE TRUCKEE-CARSON RECLAMATION PROJECT EXPERIMENT FARM IN 1916.[1]

By F. B. Headley, *Farm Superintendent.*

INTRODUCTION.

The work of the Truckee-Carson Experiment Farm was continued practically as outlined in the previous report.[2] Experiments are not confined to the farm, but many of them are conducted on private farms in the vicinity.

On the experiment farm, experiments are conducted with varieties of grasses, fruit trees, berries, and vegetables, special attention being given to tomatoes and potatoes. An experiment was also conducted to determine the value of sweet clover and alfalfa as pasture for hogs. Much of the work of the farm is related to the production of crops on alkali and impervious soils. Some chemical work is carried on in connection with the study of alkali soils.

The arrangement of the fields and the location of experiments on the experiment farm are shown in figure 1.

On private farms, experiments have been conducted with wheat, barley, potatoes, field peas, pasture grasses, fodder corn, and field corn. Five stations for making temperature observations are also maintained in typical sections of the project.

[1] The Truckee-Carson Experiment Farm is located on the United States Reclamation Project of the same name about 1 mile south of the town of Fallon, Nev. The tract consists of 100 acres withheld from entry by the Department of the Interior and set aside for use as an experiment farm.

[2] Headley, F. B. The work of the Truckee-Carson Reclamation Project Experiment Farm in 1915. U. S. Dept. Agr., Bur. Plant Indus., West. Irrig. Agr. Cir. 13 (Misc. Pub.), 14 p. 1916.

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WEATHER CONDITIONS.[1]

Each year the weather "breaks the record" in some respect. In 1916 two records were broken. Lower temperatures occurred in January than in any previous year since recording began in 1906, and the frost-free period was shorter by 13 days than the next shortest period recorded, which was 114 days, in 1911. The period between killing frosts was 101 days in 1916, as compared with an average

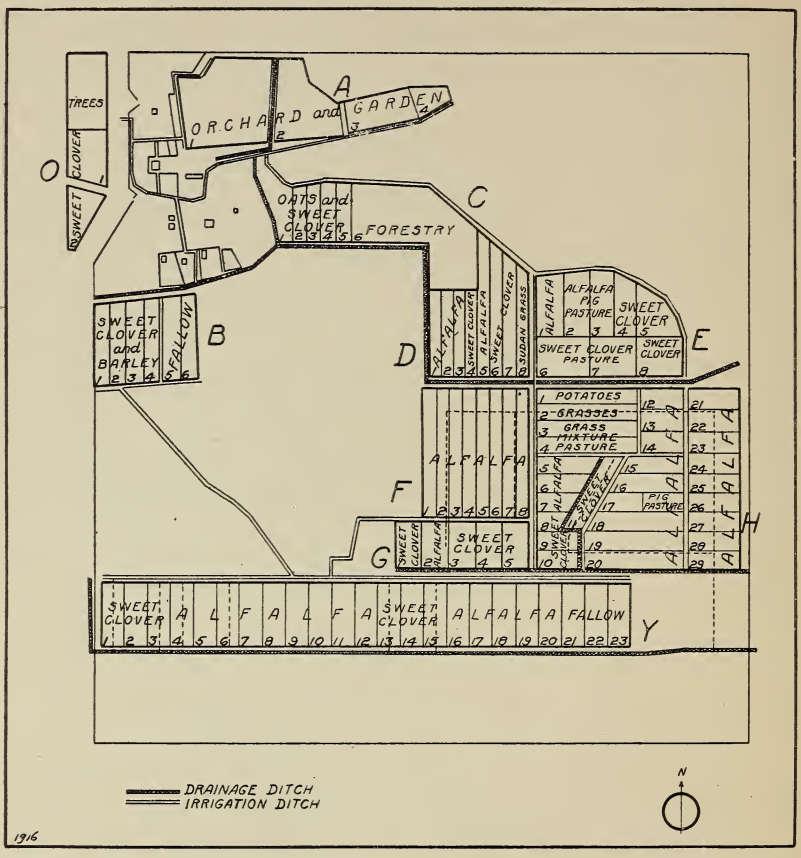

FIG. 1.—Diagram of the Truckee-Carson Experiment Farm, showing the location of the fields used for the experiments in 1916.

period of 122 days. The mean daily temperature was lower than normal during every month in the year except March and April. This abnormally cold weather prevented the maturing of such crops as corn, sorghum, melons, and tomatoes except where the fields were protected. The fruit was nearly all destroyed by the late spring frosts. Only a few orchards, in protected locations and on bench lands, escaped and produced a fair crop.

[1] Weather records are kept in cooperation with the United States Weather Bureau, the Biophysical Laboratory of the Bureau of Plant Industry, the University of Nevada, and the following private individuals: W. A. Van Voorhis, Chester Connor, C. G. Swingle, W. W. Cogswell, and J. D. Oliver.

Table I shows the results of the weather observations for 1916 and the average for all years since observations began at Fallon.

TABLE I.—*Summary of climatological observations at the Truckee-Carson Experiment Farm, 1906 to 1916, inclusive.*

PRECIPITATION (INCHES).

Year, etc.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Average for 11 years [a]	0.95	0.39	0.42	0.59	0.45	0.36	0.19	0.20	0.31	0.38	0.24	0.52	5.00
For the year 1916	2.34	.34	.23	.16	0	0	0	.09	.75	1.12	0	.27	5.30

EVAPORATION (INCHES).

Average for 9 years [b]	1.28	1.79	4.16	6.14	8.25	9.87	10.71	9.80	6.55	3.85	2.14	.92	65.46
For the year 1916	.63	.93	4.93	7.23	8.65	10.39	11.05	9.55	6.75	3.01	2.03	[c] 1.54	66.69

DAILY WIND VELOCITY (MILES PER HOUR).

Average for 8 years [d]	3.8	3.6	4.7	5.5	5.1	4.5	3.6	3.3	3.6	3.0	3.0	3.1	3.9
For the year 1916	4.4	2.5	5.4	5.6	5.2	3.7	3.5	3.2	2.9	2.9	2.8	3.8	3.8

ASPECT OF THE SKY (DAYS).

Average for 11 years: [e]													
Clear	11.4	13.8	18.1	18.7	18.2	22.2	22.6	25.0	22.8	22.8	18.0	13.3	226.9
Partly cloudy	10.1	8.4	8.2	6.9	9.1	4.3	5.6	3.6	4.0	3.2	6.1	7.1	76.6
Cloudy	9.5	6.1	4.7	4.4	3.7	3.5	2.8	2.4	3.2	5.0	5.9	10.6	61.8
For the year 1916:													
Clear	11	12	18	21	20	25	29	26	27	19	19	16	243
Partly cloudy	8	10	7	8	6	4	1	5	1	4	8	3	65
Cloudy	12	7	6	1	5	1	1	0	2	8	3	12	58

TEMPERATURE (° F.).

Year, etc.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average for 11 years:												
Absolute maximum	58.8	64.2	74.2	81.5	87.7	95.0	99.6	98.8	91.7	82.5	72.8	60.2
Mean maximum	44.1	50.3	59.7	67.1	72.2	82.0	92.0	91.2	79.9	67.7	55.8	43.7
Absolute minimum	— 1.0	8.0	16.8	21.5	27.8	37.0	43.8	40.6	29.3	21.0	9.4	4.0
Mean minimum	19.2	23.9	28.3	35.2	40.2	47.1	54.0	51.5	42.3	32.7	24.0	18.9
Mean	31.4	37.1	44.0	51.1	56.2	64.5	72.9	71.4	61.1	50.2	39.9	31.3
For the year 1916:												
Absolute maximum	52	58	79	81	86	98	100	98	94	76	75	63
Mean maximum	36.5	48.2	64.8	68.8	69.8	82.6	91.3	88.7	80.6	61.0	50.2	43.6
Absolute minimum	−22	−12	20	25	26	33	40	36	28	21	1	5
Mean minimum	14.1	24.0	31.7	34.4	37.8	44.7	49.4	48.4	41.7	31.5	18.4	15.6
Mean	25.3	36.1	48.2	51.6	53.8	63.6	70.4	68.6	61.2	46.2	34.3	29.6
Highest 11-year record	70	72	79	89	102	101	103	103	95	88	81	72
Lowest	−22	−12	9	13	21	33	38	36	26	15	−1	— 3

KILLING FROSTS.

Year.	Last in spring.	First in autumn.	Frost-free period.	Year.	Last in spring.	First in autumn.	Frost-free. period.
			Days.				*Days.*
1906	May 31	Oct. 4	126	1913	May 13	Sept. 23	133
1907	May 14	Sept. 19	128	1914	Apr. 24	Sept. 9	138
1908	May 30	Sept. 25	118	1915	May 20	Sept. 14	117
1909	May 24	Sept. 22	121	1916	June 1	Sept. 10	101
1910	May 16	Sept. 13	120				
1911	May 27	Sept. 18	114	Average	May 20	Sept. 19	122
1912	May 22	Sept. 25	126				

[a] January, February, and March, 10 years.
[b] January and February, 7 years: March, 8 years
[c] Estimated for 8 days; tank frozen.
[d] January, February, March, and April, 7 years.
[e] January, February, March, and October, 9 years.

TEMPERATURE SURVEY OF THE PROJECT.

A temperature survey of the project, carried on in cooperation with the University of Nevada, was continued throughout the year. Thermographs were stationed as follows: United States Indian Reservation, 10 miles east of Fallon; farm of T. V. Connor, 9 miles south of Fallon; farm of C. G. Swingle, 14 miles west of Fallon; farm of W. W. Cogswell, 5 miles east of Fernley; the United States Indian Reservation at Pyramid Lake; and the United States Experiment Farm, 1 mile south of Fallon.

These records are being made for the purpose of studying the effect of topography on temperature. A comparison of the minimum temperatures is of special interest because the character of the agriculture and the kinds of crops grown may be influenced by a difference of a few degrees in the minimum temperature. This is especially true when one section has an advantage in temperature over another section during the critical months of May and September.

Table II shows the mean minimum temperatures at the different stations during each month of the year. A full record was obtained for all stations only during the five months of February, March, June, July, and September. In the final column is shown the mean of the means for these five months. It will be seen that this varies according to altitude, the higher lands having higher mean minimum temperatures than the lower lands. The Pyramid Lake station has the lowest elevation. The proximity of the lake apparently has a modifying effect on the temperature under some conditions, for there are days when the temperatures there recorded depart widely from the temperatures recorded for the same days at the other stations.

TABLE II.—*Mean minimum temperatures in various parts of the Truckee-Carson Reclamation Project, showing the effect of altitude on minimum temperatures in 1916.*

Station and cooperator.	Altitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean for February, March, June, July, and September.
	Feet.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
Fernley Bench: W. W. Cogswell	4,180	12.3	26.7	32.4	37.0	40.2	47.7	55.2	54.2	48.2	35.0	.....	20.0	42.0
Swingle Bench: C. G. Swingle	4,084	14.8	24.1	33.7	.....	.....	48.5	55.4	55.3	48.2	32.4	19.6	.....	42.0
Fallon: U. S. Experiment Farm	3,970	14.1	24.0	31.7	34.4	37.8	44.7	49.4	48.4	41.7	31.5	18.4	15.6	38.3
Island district: Chester Connor	3,930	13.4	22.6	28.4	32.5	.....	44.2	51.0	50.0	42.2	32.1	.....	.....	37.7
Indian School: W. A. Van Voorhis	3,915	.....	23.7	31.2	.....	37.5	42.5	47.6	.....	40.5	30.2	17.5	.....	37.1
Pyramid Lake: J. D. Oliver	3,900	.....	26.2	30.5	.....	.....	43.8	47.0	46.0	40.5	.....	.....	.....	37.6

In Table III the mean minimum temperature of the bench lands is compared with the mean minimum temperature of the lower lands. The bench lands are represented by the Fernley and Swingle Benches and the lower lands by the records of Fallon, Indian School, and the Island district. The Pyramid Lake records are omitted from this table. The results show that the higher altitudes have a decided advantage in the matter of minimum temperatures, the mean daily minimum for the year being 3.5 degrees higher.

TABLE III.—*Comparison of the mean minimum temperatures on the bench lands and on the lower lands of the Truckee-Carson Reclamation Project in 1916.*

Section.	Average altitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average.
	Feet.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
Bench lands	4,137	13.6	25.4	33.1	37.0	40.2	48.1	55.3	54.8	48.2	33.7	19.6	20.0	35.7
Lower lands	3,942	13.8	23.4	30.4	32.5	37.7	43.8	49.3	49.2	41.5	31.3	18.0	15.6	32.2
Difference in favor of the higher lands	195	−.2	2.0	2.7	4.5	2.5	4.3	6.0	5.6	6.7	2.4	1.6	4.4	3.5

Although decided differences are found in the minimum temperatures of the two sections, the records indicate that there is no significant difference in the maximum temperatures.

The lowest temperatures occurring during the critical months of May and September are shown in Table IV. At the lower stations a killing frost occurred on September 11, while the lowest temperature recorded during the entire month of September on the bench lands was 36° F.

TABLE IV.—*Comparison of the lowest temperatures occurring in various parts of the Truckee-Carson Reclamation Project during the months of May and September, 1916.*

Month.	Minimum temperatures.					
	Fernley Bench.	Swingle Bench.	Fallon.	Island district.	Indian School.	Pyramid Lake.
	°F.	°F.	°F.	°F.	°F.	°F.
May	28	30	26	25	25	.....
September	36	36	28	25	29	31

AGRICULTURAL CONDITIONS.

In 1916 the total area under cultivation on the Truckee-Carson Reclamation Project was increased from 38,495 to 39,449 acres, an addition of 954 acres. The area producing alfalfa was increased from 18,273 to 19,541 acres, an addition of 1,268 acres. The areas devoted to barley, oats, potatoes, and onions showed a decided decrease from those of 1915.

Alfalfa continues to be the main money-producing crop, its value being 70 per cent of the value of all farm crops grown. The total value of all farm crops grown was $793,391, an increase of more than $200,000 over the 1915 crop.

Table V, prepared from the reports of the United States Reclamation Service, shows the acreage, production, and value of the more important crops and the total number of acres and farm values of all crops raised on the project in 1916.

TABLE V.—*Acreage, yields, and farm values of crops produced on the Truckee-Carson Reclamation Project in 1916.*

Crop.	Area.	Unit of yield.	Yields.			Farm values.		
			Total.	Per acre.		Per unit of yield.	Total.	Average per acre.
				Average.	Maximum.			
	Acres.							
Alfalfa hay	19,541	Ton	61,756	3.2	8	$9.00	$555,804	$28.44
Alfalfa (planted in 1916)	1,904	do	339	.2		9.00	3,051	1.60
Barley	1,658	Bushel	52,000	31.4	71	.96	49,920	30.10
Wheat	2,861	do	57,733	20.2	35	1.35	77,940	27.24
Oats	107	do	4,562	42.7	78	.64	2,920	27.29
Potatoes	177	do	29,400	166.2	500	1.20	35,280	199.32
Onions	10	do	2,842	284.2	393	1.14	3,240	324.00
Hay (except alfalfa)	1,310	Ton	1,057	.8		9.53	10,074	7.68
Garden and miscellaneous crops	503						24,955	49.61
Pasture:								
Alfalfa							16,878	
All other	10,872						13,329	1.22
Irrigated without crop	1,200							
Less duplications	694							
Total	39,449						793,391	
Per acre								20.11

In order that the acreage and production of all the leading crops may be compared, Table VI has been prepared, giving the acreage and production from 1912 to 1916, inclusive. This table shows that while the acreage of alfalfa has materially increased each year, the acreage of other crops has fluctuated. The acreage devoted to potatoes and onions has steadily decreased.

TABLE VI.—*Acreage and production of leading crops on the Truckee-Carson Reclamation Project, 1912 to 1916, inclusive.*

Year.	Alfalfa.		Barley.		Wheat.		Oats.		Potatoes.		Onions.	
	Acres.	Tons.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
1912	12,912	33,595	2,259	74,792	2,484	40,600	399	16,875	483	65,633		
1913	13,960	45,132	1,880	43,238	1,590	30,271	283	10,274	416	29,789	38	10,915
1914	13,212	59,873	1,329	31,084	1,446	29,164	417	18,000	283	23,800	20	7,600
1915	18,273	53,496	1,733	49,585	2,582	54,065	428	14,375	196	25,133	17	3,053
1916	19,541	61,756	1,658	52,000	2,861	57,733	107	4,566	177	29,400	10	2,842

The number and value of all kinds of live stock on the project are given in Table VII. No unusual or remarkable increases occurred

with any line of live stock in 1916, although the total valuation increased $130,754. This increased valuation is partly due to the increase in unit value.

TABLE VII.—*Live stock on the Truckee-Carson Reclamation Project in 1916.*

Item.	Inventory, Jan. 1.			Inventory, Dec. 31.			Increased total value.
	Number.	Unit value.	Total value.	Number.	Unit value.	Total value.	
Horses	3,210	$80.41	$258,143	3,530	$78.42	$276,810	$18,667
Mules	570	92.56	52,760	381	102.58	39,085	−13,675
Cattle:							
Dairy	2,433	82.84	201,550	2,537	80.75	204,854	3,304
Other	5,957	40.00	238,297	7,802	41.26	321,903	83,606
Sheep	4,710	4.98	23,460	5,452	6.23	33,961	10,501
Hogs	4,836	6.28	30,394	6,092	7.16	43,606	13,212
Fowls:							
Turkeys	12,000	2.41	28,920	15,239	2.52	38,417	9,497
Other	22,912	.55	12,531	29,270	.59	17,157	4,626
Bees, hives	2,500	4.05	10,125	2,958	3.77	11,141	1,016
Total			856,180			986,934	130,754

Although the number of dairy cows was not materially greater, the number of pounds of butter fat sold to the local creamery increased from 279,656 pounds to 351,120 pounds, an increase of 71,464 pounds, or 25.5 per cent. This increased production is probably due to greater efficiency in the care and handling of the dairy herds. The total amount of butter fat purchased by the local creamery was 351,120 pounds, for which $102,134.81 was paid, an average price per pound of 29.1 cents. The value of butter fat alone is about one-eighth of the total value of the farm crops grown on the project in 1916.

The yield of alfalfa per acre on the project in 1916 was somewhat lower than that of 1914, though higher than in 1915, when the crop was injured by a light spring freeze. The lower yield of 1916 was due, apparently, to the abnormally cool spring and late frosts. On the experiment farm the average yield from 11 acres was approximately 3 tons per acre. The range in yield from the different plats was very great, from one-quarter ton on the more alkaline plats to nearly 6 tons on the best plats. This lack of uniformity in yield is due largely to the uneven distribution of alkali areas. On the experiment farm the main crop of alfalfa is not grown for experimental purposes, but to provide forage for the teams and to prepare the land for other crops.

BARLEY VARIETIES.

Six varieties of barley were planted March 27 on the farm of W. H. Williams, 3 miles east of Fallon. All the varieties were from seed grown in the variety test of the previous year, with the exception of Chevalier, which was received from the University of Nevada. Table VIII shows the yields obtained.

TABLE VIII.—*Test of six barley varieties on the farm of W. H. Williams, near Fallon, Nev., in 1916.*

Variety.	Western half.			Eastern half.			Entire field.		
	Yield.	Area.	Yield per acre.	Yield.	Area.	Yield per acre.	Yield.	Area.	Yield per acre.
	Pounds.	*Acres.*	*Pounds.*	*Pounds.*	*Acres.*	*Pounds.*	*Pounds.*	*Acres.*	*Pounds.*
Coast[1]	802	0.55	1,485	1,264	0.62	2,040	2,066	1.17	1,765
Hannchen	601	.56	1,073	718	.35	2,052	1,325	.91	1,456
Nepal[2]	698	.64	1,092	852	.56	1,520	1,550	1.20	1,292
Svanhals	547	.45	1,216	889	.57	1,560	1,437	1.02	1,408
Kents	1,128	.60	1,880	1,536	.79	1,945	2,664	1.39	1,916
Chevalier	864	.54	1,600	821	.58	1,415	1,685	1.12	1,504

[1] Formerly reported as California feed. [2] Formerly reported as Hull-less.

Alkali spots reduced the yields of the Coast, Hannchen, Nepal, and Svanhals barleys in the western half of the field, so that for these varieties it would probably be more accurate to consider the yields from the eastern series, as the indication of the relative yields than to take the mean of the two series.

The rank of the varieties when the mean yield is taken is shown in the left section of Table IX, and in the middle section of the table is shown the yield of the eastern series, which would appear to be more truly representative of the merits of the varieties than the mean of the yields of the two series.

TABLE IX.—*Order of yield per acre of varieties of barley.*

1916				Two years, 1915 and 1916.			
Both series.		Eastern series.		Variety.	Mean yield.		
Variety.	Mean yield.	Variety.	Mean yield.		1915	1916	Average.
	Pounds.		*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Kents	1,916	Hannchen	2,052	Coast	2,040	1,765	1,903
Coast	1,765	Coast	2,040	Kents	1,435	1,916	1,676
Chevalier	1,504	Kents	1,945	Hannchen	1,581	1,456	1,519
Hannchen	1,456	Svanhals	1,560	Chevalier	.....	1,504	1,504
Svanhals	1,408	Nepal	1,520	Svanhals	1,435	1,408	1,422
Nepal	1,292	Chevalier	1,415	Nepal	1,218	1,292	1,255

WHEAT VARIETY TEST.

An experiment to determine the relative value of wheat varieties was conducted on the farm of Thomas Dolf, 1 mile east of Fallon. The field consisted of a sandy loam which had previously been in alfalfa and was so exceedingly irregular in shape that it was decided to make the plantings in single instead of in duplicate plats, as is usual. The soil was fairly uniform, and a good yield was obtained from all parts of the field. The wheat was planted on March 28, 1916, and was harvested on August 15. The grain was left in the shock

and thrashed on September 3. The yields obtained are shown in Table X.

TABLE X.—*Test of eight varieties of wheat on the farm of Thomas Dolf, near Fallon, Nev., in 1916.*

Variety.	Area.	Yield.			Variety.	Area.	Yield.		
		Actual.	Per acre.	Per acre.			Actual.	Per acre.	Per acre.
	Acres.	*Pounds.*	*Pounds.*	*Bushels.*		*Acres.*	*Pounds.*	*Pounds.*	*Bushels.*
Little Club	0.87	2,725	3,132	52.2	Defiance	0.78	1,969	2,525	42.1
Rieti	1.02	2,968	2,910	48.5	Sonora	.58	1,423	2,455	40.9
Marquis	.72	1,850	2,570	42.8	Bluestem	.80	1,785	2,232	37.2
Dicklow	.42	1,066	2,540	42.3	Ghirka	.48	1,042	2,173	36.2

As in 1915, the highest yielding variety was the Little Club. Tests of these varieties covering two consecutive years have now been completed, the results of which are shown in Table XI.

TABLE XI.—*Tests of eight wheat varieties on the Truckee-Carson Reclamation Project in 1915 and 1916.*

Variety.	Yield per acre.			Variety.	Yield per acre.		
	1915	1916	Average.		1915	1916	Average.
	Bushels.	*Bushels.*	*Bushels.*		*Bushels.*	*Bushels.*	*Bushels.*
Little Club	45.5	52.2	48.9	Defiance	38.5	42.1	40.3
Rieti	42.7	48.5	45.6	Sonora	37.3	40.9	39.1
Dicklow	41.6	42.3	42.0	Bluestem	40.5	37.2	38.9
Marquis	39.0	42.8	40.9	Ghirka	35.0	36.2	35.6

Judging from the results thus far obtained, it appears that Little Club is the best variety to grow to obtain the highest yields. However, this variety is not looked upon with favor by local millers because of its low gluten content. If it is desired to grow a variety more acceptable to the millers, the Marquis might be selected.

These tests have not been conducted for a period sufficiently long to make them of great value. It is possible that the relative position of the varieties may be considerably changed when grown under different conditions.

FERTILIZER EXPERIMENT WITH WHEAT IN GREENHOUSE BEDS.

In January, 1916, an experiment was begun in the greenhouse beds to determine the effect of various fertilizers on the growth of wheat. The fertilizers used were acid phosphate, rock phosphate, gypsum, potassium sulphate, ammonium sulphate, bone meal, complete fertilizer, and barnyard manure. The acid fertilizer produced a very remarkable growth in comparison with the growth of other beds. This is in accord with field experiments carried on here in previous years, in which the acid phosphate proved to be the most efficient

fertilizer in increasing yields of alfalfa, grain, and onions. Barnyard manure was also decidedly beneficial, but the other fertilizers produced no significant increases in yield. (Table XII).

TABLE XII.—*Fertilizer experiment with wheat in greenhouse beds.*

Bed.	Treatment.	Fertilizer applied per square foot.	Number of plants.	Weight of crop.	Bed.	Treatment.	Fertilizer applied per square foot.	Number of plants.	Weight of crop.
		Grams		*Grams.*			*Grams.*		*Grams.*
1	Check	0	29	90	8	Ammonium sulphate	5	30	72
2	Acid phosphate	5	30	220					
3	Rock phosphate	10	30	73	9	Bone meal	10	30	56
4	Check	0	30	57	10	Check	0	30	43
5	Gypsum	10	30	54	11	Complete fertilizer		29	52
6	Potassium sulphate	10	30	56	12	Manure		30	117
7	Check	0	30	45					

CORN VARIETY TEST.

Twenty-two varieties or varietal selections of corn were planted on May 15 on the farm of T. V. Connor, in the Island district, 9 miles south of Fallon. The varieties were planted in single rows 426 feet long, and the entire series was duplicated. Two rows 426 feet long constitute an area of 0.029 of an acre for each variety.

The season was abnormally cold and the growth of the corn was so much retarded that none of the varieties were fully matured by the time of the first autumn frost, on September 11. It is interesting to note that in 1915 the same varieties were much better matured, although they were planted 15 days later and had that much less time to grow. This suggests that the so-called 90-day or 100-day corn matures in the time specified only in the locality where it has been bred, and there only in normal seasons. The 90-day corn of Minnesota or Dakota will probably always require a longer period in the Truckee-Carson region, where the nights are relatively cold.

If the season of 1916 were normal, the prospect of growing corn for grain production on the project would be well nigh hopeless, but the records show no other season so cold and backward.

The Australian White Flint was probably the most nearly matured of the varieties and gave the highest yield. It has proved to be a very dependable variety. The ears of most varieties were so soft and immature generally that little dependence can be placed on the results. The table of yields is therefore not reported.

SILAGE CORN.

Five varieties of silage corn were planted on May 30 on the Churchill creamery farm. The field was poorly arranged and during

the summer no cultivation was given. Because of this it was decided that the experiment would be valueless as a variety test and the weights of the individual varieties were therefore not determined. The product of the entire field was weighed and the yield per acre of green corn was found to be 4.1 tons. A total of 41,405 pounds was obtained from an area of 5.03 acres.

POTATOES.

A test of potatoes was conducted on the experiment farm with 21 varieties or strains of potatoes. They were planted on May 1 in single rows 370 feet long. Some of the varieties always produce a relatively large percentage of knotty, misshapen tubers, and there are others which are characteristically free from these defects. Those varieties which have been found best in regard to uniformity in shape and size are American Wonder, Pearl, Hundredfold, Early Ohio, Rural New Yorker No. 2, and Irish Cobbler. The Burbank variety is much inclined to make a second growth and to produce a large percentage of unmarketable potatoes.

VARIETY TEST OF POTATOES.

A test comparing three varieties of potatoes was conducted on the farm of Edmund Dietz, 14 miles west of Fallon. In this experiment the Scotch Rose and the Russet Burbank were grown, with Dietz selected Burbank seed for comparison as a check. Two lots of Scotch Rose were planted, one purchased from California and the other from Oregon. The Russet Burbank was also obtained from California. The yields are shown in Table XIII.

TABLE XIII.—*Comparative test of varieties of potatoes on the farm of Edmund Dietz, near Fallon, Nev., in 1916.*

Variety.	Number of hills per row.[1]	Yield per row.			Yield of table potatoes.		
		Total.	Table potatoes.	Small tubers.	Average per hill.	Per acre.	
		Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Bushels.*
Scotch Rose (Oregon)	51	95	85	10	1.7	4,115	68.6
Burbank (Dietz selected)	177	328	303	25	1.7	14,660	244.5
Russet Burbank	162	275	230	45	1.4	11,140	186.0
Burbank (Dietz selected)	177	288	228	60	1.3	11,040	184.0
Scotch Rose (California)	167	248	228	20	1.4	11,040	184.0
Burbank (Dietz selected)	177	261	218	43	1.2	10,560	176.0

[1] The rows were 300 feet long and 3 feet apart, making approximately 0.02 of an acre per row.

It will be seen that the Scotch Rose from California, the Russet Burbank, and the Dietz selected Burbank produced about equally. The Scotch Rose from Oregon germinated poorly and consequently

did not yield well. The average yield per hill of all varieties was practically equal, the difference being within the limits of experimental error.

The Russet Burbank is supposed to be more resistant to eelworm and disease infection, besides being less subject to bruising in handling than the smooth Burbank.

VARIETY TEST OF TOMATOES.

The varieties of tomatoes tested were planted in the greenhouse on March 10 in a sandy loam soil obtained from field A-4. They were transferred to the field the last week in May. The season was abnormally cold, and the ripening of the crop was about two weeks later than in previous years. Plantings were made in duplicate. The individual plants were in rows 4 feet apart each way, making 2,722 plants per acre. The plats were cultivated as soon as the soil was dry enough after each irrigation and until the time when the overhanging vines made cultivation difficult.

After ripening began, pickings were made about twice a week, and the product from each variety was weighed. About the first of September, windrows of wheat straw were put through plat No. 1, ready to be spread over the vines when frost became imminent. The result was that the protected plat produced heavily until October 7, while in the unprotected plat the vines were killed by the first freeze (on September 11). The yield of the unprotected plat was only one-eighth of that of the protected plat.

Where it is available, straw may be spread to a depth of 5 or 6 inches over any garden product, such as tomatoes, melons, and cucumbers, without injury and with good results. After it is once applied it is not necessary to remove it; picking can be done by simply lifting the straw from each vine and replacing it as soon as the picking is finished. It is probable that a canvas or burlap protection will be found by some growers to be more convenient, as it can be more quickly applied and removed. When canvas is used it should be supported a few inches above the vines, as all foliage in direct contact with it is likely to be frozen.

The Earliana was by far the best-yielding variety in 1916, but it came out second best in 1915, with Perfection at the head. Earliana is not so desirable a tomato as some of the other varieties, because of its tendency to be irregular in shape. The Perfection was the highest yielding variety in 1914 and 1915, while in 1916 it took second place. It is a smooth, red tomato, of excellent quality, suitable for marketing or canning purposes. Other desirable varieties are the Favorite, Bonnie Best, Coreless, Globe, and Stone.

The results in detail are shown in Table XIV.

TABLE XIV.—*Comparative test of 20 tomato varieties on the Truckee-Carson Reclamation Project in 1916.*

Variety.	Date first ripe.	Plat 1 (protected).				Plat 2 (unprotected).			
		Number of plants.	Yield (pounds).			Number of plants.	Yield (pounds).		
			Total.	Per plant.	Per acre.		Total.	Per plant.	Per acre.
1. Earliana	Aug. 7	27	374	13.8	37,777	25	96	3.8	10,480
2. Perfection	Aug. 30	24	190	8.3	21,590	19	55	2.9	7,900
3. Favorite	Sept. 4	26	198	7.6	20,732	26	3	.1	315
4. Bonnie Best	Aug. 7	27	167	6.2	16,868	26	13	.5	1,363
5. Coreless	Aug. 28	27	159	5.9	16,060	27	27	1.0	2,730
6. Globe	Sept. 4	26	135	5.2	14,136	25	8	.3	823
7. Stone	Sept. 8	26	127	4.9	13,298	15	2	.1	364
8. Paragon	Sept. 4	27	116	4.3	11,717	21	0	0	0
9. Ponderosa	...do....	22	94	4.3	11,605	16	0	0	0
10. Honor Bright	Sept. 27	22	77	3.5	9,506	22	0	0	0
11. Dwarf Champion	Aug. 30	27	79	2.9	7,980	26	6	.2	630
12. Beauty	Sept. 2	28	80	2.9	7,780	25	4	.2	437
13. Buckeye State	.....	28	79	2.8	7,680	27	4	.1	403
14. Acme	Sept. 2	25	68	2.7	7,410	26	4	.2	420
15. Dwarf Stone	Sept. 20	23	31	1.3	3,670	7	0	0	0
16. Golden Queen	Oct. 7	26	22	.8	2,310	24	0	0	0
17. Early Marketer	.....	.....	.....	.....	.....	6	8	1.3	3,640
18. Early Jewell	.....	.....	.....	.....	.....	24	11	.5	1,250
19. John Baer	.....	.....	.....	.....	.....	16	3	.2	512
20. Hummer	.....	.....	.....	.....	.....	16	0	0	0

PASTURING HOGS ON FIELD PEAS AND WHEAT.

An experiment with field peas and wheat as hog pasture was conducted on the farm of C. G. Swingle, 5 miles southeast of Hazen, cooperating with the experiment farm. About April 10, 150 pounds of Canada field peas, together with 75 pounds of wheat, were planted on 1¼ acres of land which had previously been in alfalfa. There was good germination of both the peas and wheat. Unfortunately, the growth of wheat became so thick that the pea growth was seriously retarded, so that it proved to be more a test of the value of mature wheat than of field peas for fattening hogs.

On September 7, 34 pigs, weighing 2,140 pounds, were turned into the field. On September 28 they were again weighed and removed. The final weight was 3,090 pounds, a net gain of 950 pounds on 1¼ acres, or 760 pounds per acre. With pork at 7 cents a pound the value of the gain would be $53.20 per acre, which may be considered a net gain, as no additional feed was given during the period the pigs were in the field. Some wheat still remained on the field, which was picked up by the stock hogs after the removal of the first lot. The profit obtained from the increase in weight of the hogs was fully equal to the value of the crop had it been harvested and thrashed in the usual manner.

SWEET CLOVER.

The use of sweet clover is gradually increasing on the project. It is used chiefly for planting on land not suitable for alfalfa or other crops because of the presence of alkali. It has been found that sweet clover may be grown successfully in soil having sufficient alkali salts

to interfere seriously with the growth of alfalfa and other crops. The plowing under of a heavy growth of this crop (fig. 2) is believed to be beneficial in reclaiming alkali soil and in improving the texture of the heavy impervious soils. Further experimentation will be necessary, however, to determine just how efficient it is for this purpose.

When cut early, before the stems become coarse and woody, sweet clover makes good hay. Horses and cattle eat all but the coarser stems. It is still an open question whether cows and sheep can be safely pastured on this crop. Several cases of cows bloating on sweet

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FIG. 2.—Plowing under sweet clover on the Truckee-Carson Experiment Farm.

clover have been reported, but there is the possibility that the bloat in these cases may have been produced by alfalfa plants which were not noticed by the owner of the stock.

Plats E–6 and E–7 on the experiment farm, containing 1¼ acres of sweet clover, were pastured with two cows from April 28 to August 15. A third cow was put in for a short time, from June 15 to about August 1. No bloating occurred, but the cows did not stay in the best of condition, although there was at all times sufficient feed. Further experiments will be necessary to determine the real value of this crop for pasturing milch cows.

EXPERIMENTS WITH PIGS ON SWEET CLOVER PASTURE.

On April 24, 18 pigs were put into plats E–6 and E–7, having an area of 1¼ acres. Those included in the experiment were as follows:

3 Duroc pigs, purchased from the Churchill creamery farm, age about 10 weeks, average weight 25 pounds.
2 Berkshire pigs, raised on the experiment farm, age 9 weeks, average weight 26 pounds.
3 Berkshire-Duroc crosses, raised on the experiment farm, age 8 weeks, average weight 28 pounds.
10 grades, raised by A. Baumann, age probably 3 months, average weight 38.7 pounds.

The sweet clover was about 10 inches high and growing vigorously throughout the experiment. The pigs seemed to eat the sweet clover readily enough, but did not make satisfactory gains; so they were removed on the eighteenth day (May 13) and transferred to alfalfa pasture. The results in detail are shown in Table XV.

TABLE XV.—*Pigs pastured on sweet clover on the Truckee-Carson Experiment Farm, in 1916.*

Items of comparison.	Result.	Items of comparison.	Result.
Number of pigs	18	Barley required to make 1 pound of gain...pounds..	3.9
Initial weight...pounds..	598		
Final weight...do....	655	Cost of barley, at 1½ cents a pound	$3.34
Total gain...do....	57	Value of gain, at 7 cents a pound	3.99
Daily gain...do....	3.2	Net return	.65
Do...per cent..	.51		
Barley fed...pounds..	223		

Although in this experiment the gains with the pigs on sweet clover were so small as to prove unprofitable, it would not be wise to draw the conclusion that this would be true under slightly different conditions. Further experiments along this line will be made.

EXPERIMENTS WITH PIGS ON ALFALFA PASTURE.

Lot 1.—The pigs used for the experiment in pasturing on alfalfa consisted of three Durocs, three Berkshires, and four Duroc-Berkshire crosses. They were placed in the pasture when about 9 weeks old.

The Berkshires and crosses were raised on the experiment farm and were in excellent condition at the beginning of the experiment. The Durocs were secured from the Churchill creamery farm and were in less thrifty condition.

The area of the pasture was one-fourth of an acre. It was divided into two parts, and the pigs were changed from one side to the other at the end of each week. Sufficient pasturage was secured until the latter part of August. Four of the pigs were removed on September 9 because of the short growth of the alfalfa. The remaining pigs were left on the pasture for 14 days longer and then removed to the dry lot for fattening. A 2 per cent ration of barley was fed throughout the experiment. Gains in live weight were credited at 7 cents per pound and the barley fed was charged at 1½ cents a pound, which is about the normal wholesale price in this locality.

The Berkshires and the crosses made about equal gains. The Durocs never appeared to be as thrifty as the others, and they made less satisfactory gains. It would appear that a good start for the small pigs is of greater importance than the breed. The total net return from this lot was $24.04, or a profit of $96.16 per acre above the cost of the barley.

Lot 2.—The pigs used in this experiment were the ones removed from the sweet-clover pasture. During the first week one of the pigs was accidentally killed, leaving 17 in all. The area of the pasture was 0.53 of an acre, divided into two parts, as with lot 1. The growth of the alfalfa was not good, on account of part of the field being alkaline, and as a result poorer gains were made than with lot 1. Because of the poor growth of the alfalfa, seven pigs were removed August 5. The pigs removed consisted of three Durocs, one Berkshire, one cross, and two grades. On September 6 the remaining eight grades were removed and four pigs from lot 1 were put in. The results are summarized in Table XVI. It will be noted that the net return per acre for the full period of 130 days was $63.20 and that 2.36 pounds of barley were required to produce 1 pound of gain. This latter figure is the same as for lot 1.

TABLE XVI.—*Results obtained with pigs pastured on alfalfa with a 2 per cent ration of barley on the Truckee-Carson Experiment Farm, in 1916.*

Items of comparison.	Lot 1.			Lot 2.			
	Apr. 24 to Sept. 9, 138 days.	Sept. 9 to 23, 14 days.	Total period, 152 days.	May 13 to Aug. 5, 84 days.	Aug. 5 to Sept. 6, 32 days.	Sept. 9 to 23, 14 days.	Total period, 130 days.
Initial weight per acre.....pounds..	1,048	2,264	.....	1,187	1,645	962	.....
Final weight per acre.....do....	3,600	2,500	.....	2,413	2,102	1,066	.....
Total gain per acre.....do....	2,552	236	2,788	1,260	457	104	1,821
Barley fed.....do....	6,276	324	6,600	2,893	1,128	270	4,291
Barley fed per pound of gain.....do....	2.46	1.37	2.37	2.29	2.47	2.60	2.36
Value of gain, at 7 cents a pound.....	$178.64	$16.52	$195.16	$88.20	$31.99	$7.28	$127.47
Value of barley fed, at 1½ cents per pound.....	94.14	4.86	99.00	43.40	16.92	4.06	64.37
Net return per acre.....	84.50	11.66	96.16	44.80	15.07	3.22	63.10

FEEDING PIGS IN A DRY LOT.

An experiment was begun on September 30 with the Berkshires and crosses that had been removed from the alfalfa pasture experiments. They were given an unlimited quantity of alfalfa hay, which in this experiment was not weighed. In addition to the hay, they were given a 3 per cent ration of barley from September 30 to October 24, a 3½ per cent ration from October 24 to November 16, and an unlimited supply from November 16 to December 2, when they were sold.

Table XVII shows that, although the percentage of daily gain was materially increased by feeding an unlimited ration, the amount of grain required to produce 1 pound of gain was unchanged, the aver-

age for the entire period being 4.6. At the prices indicated for barley and for gains in weight it can not be said that feeding would prove profitable, as the cost of the barley was practically equal to the value of the gain. If the value of the alfalfa were included there would be a net loss. Gains were made as economically when the pigs were given an unlimited quantity of barley as when a 3 or a 3½ per cent ration was fed, and there was the advantage of much more rapid gains when the more generous ration was given.

TABLE XVII.—*Result of feeding pigs in a dry lot after removal from pasture on the Truckee-Carson Experiment Farm, in 1916.*

Items of comparison.	Sept. 30 to Oct. 9, 9 days.	Oct. 9 to 24, 15 days.	Oct. 24 to Nov. 7, 14 days.	Nov. 7 to 16, 9 days.	Nov. 16 to Dec. 2, 16 days.	Total period, 63 days.
Initial weight.....pounds..	1,117	1,154	1,263	1,414	1,505	1,117
Final weight.....do....	1,154	1,263	1,414	1,505	1,805	1,805
Gain in weight.....do....	37	109	151	91	300	688
Barley fed.....do....	302	450	618	445	1,340	3,155
Barley fed per pound of gain.....do....	8.2	4.1	4.1	4.9	4.5	4.6
Barley fed as related to live weight.....per cent..	3.0	3.0	3.5	3.5	5.6	.....
Value of gain, at 7 cents a pound.....	$2.59	$7.63	$10.57	$6.37	$21.00	$48.16
Value of barley fed, at 1½ cents a pound.....	4.53	6.75	9.27	6.67	20.10	47.32
Net profit.....	−1.94	.88	1.30	−.30	.90	.84

THE TREATMENT OF ALKALI SOIL.

The treatments given to the first 18 plats of this field of alkali soil (field Y) are indicated in Table XVIII. The gypsum and manure were added and the tile laid in the summer of 1914. The crops were seeded in 1915.

TABLE XVIII.—*Effect of gypsum and other treatments on the improvement of alkali lands on the Truckee-Carson Experiment Farm, in 1916.*

Plat.	Treatment.	Crop.	Yield.		
			First cutting.	Average of treated plats.	Increase over check plat.
No. 1...	Tile, gypsum, and manure	Sweet clover	570	745	55
No. 2...	Check	do	690		
No. 3...	Tile, gypsum, and manure	do	920		
No. 4...	Tile, gypsum, and manure	Alfalfa	100	490	15
No. 5...	Check	do	475		
No. 6...	Tile, gypsum, and manure	do	880		
No. 7...	Gypsum, manure	do	1,075	1,125	175
No. 8...	Check	do	950		
No. 9...	Gypsum, manure	do	1,675		
No. 10..	Gypsum	do	635	338	338
No. 11..	Check	do	.....		
No. 12..	Gypsum	do	40		
No. 13..	Tile, gypsum, and manure	Sweet clover	930	935	675
No. 14..	Check	do	260		
No. 15..	Tile, gypsum, and manure	do	940		
No. 16..	Sulphuric acid	Alfalfa	230	330	330
No. 17..	Check	do	.....		
No. 18..	Sulphuric acid	do	100		

In Table XVIII are given the first recorded yields of alfalfa and sweet clover. The first cutting was made in June, 1916. The second crop of sweet clover was in all cases plowed under. Only two cuttings of alfalfa were made. The yields of the second cutting were accidentally lost. Table XVIII shows (1) that sweet clover always outyielded the adjacent plats of alfalfa and (2) that all treatments resulted in an increased yield. The effect of the different kinds of treatment can not be directly compared, because of the variability of the soil. Volunteer sweet clover which appeared in plats 5 to 10, inclusive, increased the yields of these plats.

Approved:

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Chief of Bureau.

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